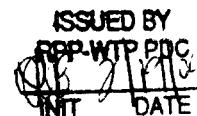




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Author(s): M Daggett M Friedrich

Principal author
signature:

M Daggett *Mark Friedrich*

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Checked by: K Herman

Checker signature:

K Herman

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S Anderson

H. Val McEwen

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C&I Engineering Manager

Approver signature:



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River Protection Project
Waste Treatment Plant
2435 Stevens Center Place
Richland, WA 99352
United States of America
Tel: 509 371 2000

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History Sheet

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Acronyms and Abbreviations

AI	analog input
ETF	Effluent Treatment Facility
LAH	level alarm high
LAHH	level alarm high-high
LERF	Liquid Effluent Retention Facility
LI	level indication
LOL	lower operating limit
LSH	level switch high
LSHH	level switch high-high
LT	level transmitter
P&ID	piping and instrumentation diagram
PT	Pretreatment
UOL	upper operating limit
WTP	River Protection Project – Waste Treatment Plant

Glossary

acquire	Acquire is a command under a batch control that reserves a group of equipment for that particular batch control operation.
batch	This refers to material that is being produced or that has been produced by a single execution of a batch process.
batch control	This term refers to control activities and control functions that provide an ordered set of processing activities to complete a batch process.
batch process	A batch process leads to the production of a finite quantity of material by subjecting quantities of input material to an ordered set of processing activities over a finite period of time using one or more pieces of equipment.
control system	This term refers to electronic processors that perform regulatory and logic control functions necessary for normal operation of the plant.
exception handling	This term refers to those functions that deal with plant or process contingencies and other events that occur outside the normal or desired behavior of batch control.
interlock	This term refers to a mechanism that automatically brings about or prevents the operation of another mechanism.
LOL	Lower operating limit- A vessel low-level set point used to stop a transfer-out batch operation from that vessel under normal plant operations.
permissive	A permissive is an interlock that allows a device to change state or a sequence to start. Once a device has changed state or a sequence has started, a permissive has no further effect on the device or sequence.
release	Release is a command under a batch control that opens up a group of equipment for any batch control to acquire.
trip	A trip is a conditional interlock that forces a device or a sequence to a defined state. A trip continues to have an effect on the device or sequence until the interlock condition no longer exist.
UOL	Upper operating limit – A vessel high-level setpoint used to stop a transfer-in batch operation to that vessel under normal plant operation.

1 Introduction

This document describes the instrument control logic for tanks and ancillary equipment for the radioactive liquid waste disposal (RLD) system within the pretreatment (PT) facility that are associated with dangerous waste management.

2 Applicable Documents

24590-PTF-M6-RLD-P0001, *P&ID-PTF Radioactive Liquid Waste Disposal System Process Condensate RLD-TK-00006A/B*

24590-PTF-M6-RLD-P0002, *P&ID-PTF Radioactive Liquid Waste Disposal System Process Condensate RLP-PMP-00011A/B & 14A/B*

24590-PTF-M6-RLD-P0003, *P&ID-PTF Radioactive Liquid Waste Disposal System Effluent Collection RLD-VSL-00017A/B & RLD-PMP-00005A/B*

24590-PTF-M6-RLD-P0004, *P&ID-PTF Radioactive Liquid Waste Disposal System Process Condensate Distribution.*

24590-PTF-M6-RLD-P0006, *P&ID-PTF Radioactive Liquid Waste Disposal System Effluent Collection RLD-VSL-00017A/B*

24590-WTP-M6-50-P0001, *P&ID Symbols and Legend Sheet 1 of 6*

24590-WTP-M6-50-P0002, *P&ID Symbols and Legend Sheet 2 of 6*

24590-WTP-M6-50-P0003, *P&ID Symbols and Legend Sheet 3 of 6*

24590-WTP-M6-50-P0004, *P&ID Symbols and Legend Sheet 4 of 6*

24590-WTP-M6-50-P0005, *P&ID Symbols and Legend Sheet 5 of 6*

24590-WTP-M6-50-P0006, *P&ID Symbols and Legend Sheet 6 of 6*

3 Description

The following tank and ancillary equipment are associated with dangerous waste management within the RLD system as a part of the PT facility.

- Process condensate tank (RLD-TK-00006A)
- Process condensate tank (RLD-TK-00006B)
- Alkaline effluent vessel (RLD-VSL-00017A)
- Alkaline effluent vessel (RLD-VSL-00017B)
- Area sump (RLD-SUMP-00003)

3.1 Process Condensate Tank (RLD-TK-00006A)

Process condensate tank (RLD-TK-00006A) receives effluent from multiple sources, and then recycles the condensate within the facility or transfers the condensate to process condensate tank RLD-TK-00006B, depending upon condensate requirements within the PT facility. Transfers in and out of the process condensate tank (RLD-TK-00006A) may occur simultaneously.

When the vessel is available to receive effluent, the operator will initiate the transfer-in sequence. Once the sequence is initiated, the control system will verify that instruments, utilities, and equipment associated with the transfer are within operational parameters. If any of the monitored parameters are not within the specified limits during the transfer, the control system will switch to exception handling logic. The transfer is stopped by the control system when any of the following are true:

- The level in the process condensate tank (RLD-TK-00006A) reaches its upper operating limit (UOL)
- The level of the sending entity reaches its lower operating limit (LOL)

Once the process condensate tank (RLD-TK-00006A) is ready to transfer, the operator will initiate the transfer-out sequence within the control system. Once initiated, the control system verifies those instruments, utilities, and equipment associated with the transfer are within operational parameters and remain as such throughout the transfer. If any of the monitored parameters are not within the specified limits during the transfer, the control system will switch to exception handling logic. The transfer will end when any of the following are true:

- The level in the process condensate tank (RLD-TK-00006A) reaches its lower operating limit (LOL)
- The process condensate tank (RLD-TK-00006B) reaches its upper operating limit (UOL)

When the level is no longer within the normal operating range due to an abnormality, interlocks along with alarms within the control system help prevent an overflow condition. Figure 1 shows the interlocks and alarms for the level instrument associated with the process condensate tank (RLD-TK-00006A). At the high-alarm setpoint, an alarm is generated. At the high-high alarm setpoint, an alarm is generated and all dedicated controlled feeds are isolated. Isolation occurs by a combination of either stopping the motive force or closing valves.

3.2 Process Condensate Tank (RLD-TK-00006B)

Process condensate tank RLD-TK-00006B receives effluent primarily from alkaline effluent vessels RLD-VSL-00017A and RLD-VSL-00017B, samples the effluent when required, and then transfers the condensate to the Liquid Effluent Retention Facility (LERF) or the Effluent Treatment Facility (ETF). Transfers in and out of the process condensate tank (RLD-TK-00006A) may occur simultaneously.

When the vessel is available to receive effluent, the operator will initiate the transfer-in sequence. Once the sequence is initiated, the control system will verify that instruments, utilities, and equipment associated with the transfer are within operational parameters. If any of the monitored parameters are not within the specified limits during the transfer, the control system will switch to exception handling logic. The transfer is stopped by the control system when any of the following are true:

- The level in the process condensate tank (RLD-TK-00006B) reaches its upper operating limit (UOL)
- The level of the sending entity reaches its lower operating limit (LOL)

Due to additional complexities when transferring from the RLD system to LERF/ETF, there are additional controls to administer the transfer. This data exchange is controlled through administrative and hardwired permissive/trip controls.

Administrative controls take place over the telephone between the PT facility and LERF/ETF, and are a part of the pre-start and post-transfer checks.

The pre-start controls are listed as follows and are confirmed prior to commencing the transfer:

Pre-Start Controls	Purpose
<ul style="list-style-type: none"> • Confirm correct transfer line. 	This will allow for proper valve alignment and monitoring of the transfer, since the transfer lines are different sizes and thus have different transfer restrictions.
<ul style="list-style-type: none"> • Calculate the total volume to be transferred to LERF/ETF. 	This will be the setpoint for the flow totalizer.
<ul style="list-style-type: none"> • Confirm that the level transmitter, temperature transmitter, control valves, flow meters, and other associated instrumentation are functional. 	This will ensure that the transfer can be monitored and controlled.

Once the operator initiates the transfer-out sequence, the control system verifies that all instruments, utilities, and equipment associated with the transfer are within operational parameters. If any of the monitored parameters are not within the specified limits during the transfer, the control system will switch to exception handling logic. The transfer will end when a specified volume is transferred.

The following are the post-transfer controls that take place once transfer of feed has been completed:

Post-Transfer Controls	Purpose
<ul style="list-style-type: none"> • Secure valving. 	This will ensure that the valves are in proper position after transfer.
<ul style="list-style-type: none"> • Calculate volume transferred to LERF/ETF. 	This value is used for waste management tracking.

The following data signal (permissive/trip) exchanges between the PT facility and LERF/ETF are monitored before and during a transfer. This exchange is done using signal cables originating at the WTP control system and terminating at LERF/ETF's control system. These signals tie into permissive/trip logics performed on the PT control system.

Permissive/Trip Signal	Purpose
<ul style="list-style-type: none"> • Detect leaks in the WTP section of the transfer lines. 	This signal will be used as a trip to stop the transfer.
<ul style="list-style-type: none"> • Detect leaks in the LERF/ETF section of the transfer lines. 	This signal will be used as a trip to stop the transfer.

When the level is no longer within the normal operating range, due to an abnormality, interlocks along with alarms within the control system help prevent an overflow condition. Figure 2 shows the interlocks and alarms for the level instrument associated with process condensate tank RLD-TK-00006B. At the high-alarm setpoint, an alarm is generated. At the high-high alarm setpoint, an alarm is generated and all dedicated controlled feeds are isolated. Isolation occurs by either stopping the motive force or closing valves, or both.

3.3 Alkaline Effluent Vessel (RLD-VSL-00017A)

Alkaline effluent vessel (RLD-VSL-000017A) receives effluent from multiple sources, samples the effluent, and then, depending upon sample results, transfers effluent into process condensate tank RLD-TK-00006B.

Alkaline effluent vessel (RLD-VSL-00017A) is a mirror image of the other alkaline effluent vessel (RLD-VSL-00017B) and they work in parallel to accomplish their tasks. While one vessel is receiving fluid, the other is sampling and transferring fluid out of the vessel. If the vessel is not sampling or transferring, multiple transfers are allowed into the vessel simultaneously. Once the UOL is reached, the inlet feeds are isolated and the alkaline effluent vessel (RLD-VSL-00017A) is ready to sample and transfer. Meanwhile, the other alkaline effluent vessel (RLD-VSL-00017B) is now enabled to receive fluid.

The sample sequence will mix the contents of the vessel for a specified amount of time and then sample the tank contents. Once the results are processed, the tank contents will be ready to transfer to the proper vessel.

Once the alkaline effluent vessel (RLD-VSL-00017A) is ready to transfer its contents, the operator will initiate the transfer-out sequence within the control system. Once initiated, the control system verifies those instruments, utilities, and equipment associated with the transfer are within operational parameters and remain as such throughout the transfer. If any of the monitored parameters are not within the specified limits during the transfer, the control system will switch to exception handling logic. The transfer will end when any of the following are true:

- The level in the alkaline effluent vessel (RLD-VSL-00017A) reaches its lower operating limit (LOL)
- The level of the receiving entity reaches its upper operating limit (UOL)

When the level is no longer within the normal operating range due to an abnormality, interlocks along with alarms within the control system help prevent an overflow condition. Figure 3 shows the interlocks and alarms for the level instrument associated with the alkaline effluent vessel (RLD-VSL-00017A). At the high-alarm setpoint, an alarm is generated. At the high-high alarm setpoint, an alarm is generated and all dedicated controlled feeds are isolated. Isolation occurs by either stopping the motive force or closing valves, or both.

3.4 Alkaline Effluent Vessel (RLD-VSL-00017B)

Alkaline effluent vessel RLD-VSL-000017B receives effluent from multiple sources, samples the effluent, and then, depending upon sample results, transfers into process condensate tank RLD-TK-00006B.

Alkaline effluent vessel (RLD-VSL-00017B) is a mirror image of the other alkaline effluent vessel (RLD-VSL-00017A) and they work in parallel to accomplish their tasks. While one vessel is receiving fluid, the other is sampling and transferring fluid out of the vessel. If the vessel is not sampling or transferring, multiple transfers are allowed into the vessel simultaneously. Once the UOL is reached, the inlet feeds are isolated and the alkaline effluent vessel (RLD-VSL-00017B) is ready to sample and transfer. Meanwhile, the other alkaline effluent vessel (RLD-VSL-00017A) is now enabled to receive fluid.

The sample sequence will mix the contents of the vessel for a specified amount of time and then sample the tank contents. Once the results are processed, the tank contents will be ready to transfer to the proper vessel.

Once the alkaline effluent vessel (RLD-VSL-00017B) is ready to transfer its contents, the operator will initiate the transfer-out sequence within the control system. Once initiated, the control system verifies those instruments, utilities, and equipment associated with the transfer are within operational parameters and remain as such throughout the transfer. If any of the monitored parameters are not within the specified limits during the transfer, the control system will switch to exception handling logic. The transfer will end when any of the following are true:

- The level in the alkaline effluent vessel (RLD-VSL-00017B) reaches its lower operating limit (LOL)
- The level of the receiving entity reaches its upper operating limit (UOL)

When the level is no longer within the normal operating range due to an abnormality, interlocks along with alarms within the control system help prevent an overflow condition. Figure 4 shows the interlocks and alarms for the level instrument associated with the alkaline effluent vessel (RLD-VSL-00017B). At the high-alarm setpoint, an alarm is generated. At the high-high alarm setpoint, an alarm is generated and all dedicated controlled feeds are isolated. Isolation occurs by either stopping the motive force or closing valves, or both.

3.5 Area Sump (RLD-SUMP-00003)

The area sump (RLD-SUMP-00003) receives overflow from process condensate tank RLD-TK-00006A and process condensate tank RLD-TK-00006B. The sump is maintained dry. Upon detection of a high liquid level in the sump, the control system generates an alarm, at which point the operator must take the necessary action to empty the sump. Figure 5 shows the alarms for the level instruments associated with area sump RLD-SUMP-00003.

Figure 2 Level Measurement for Process Condensate Tank (RLD-TK-00006B)

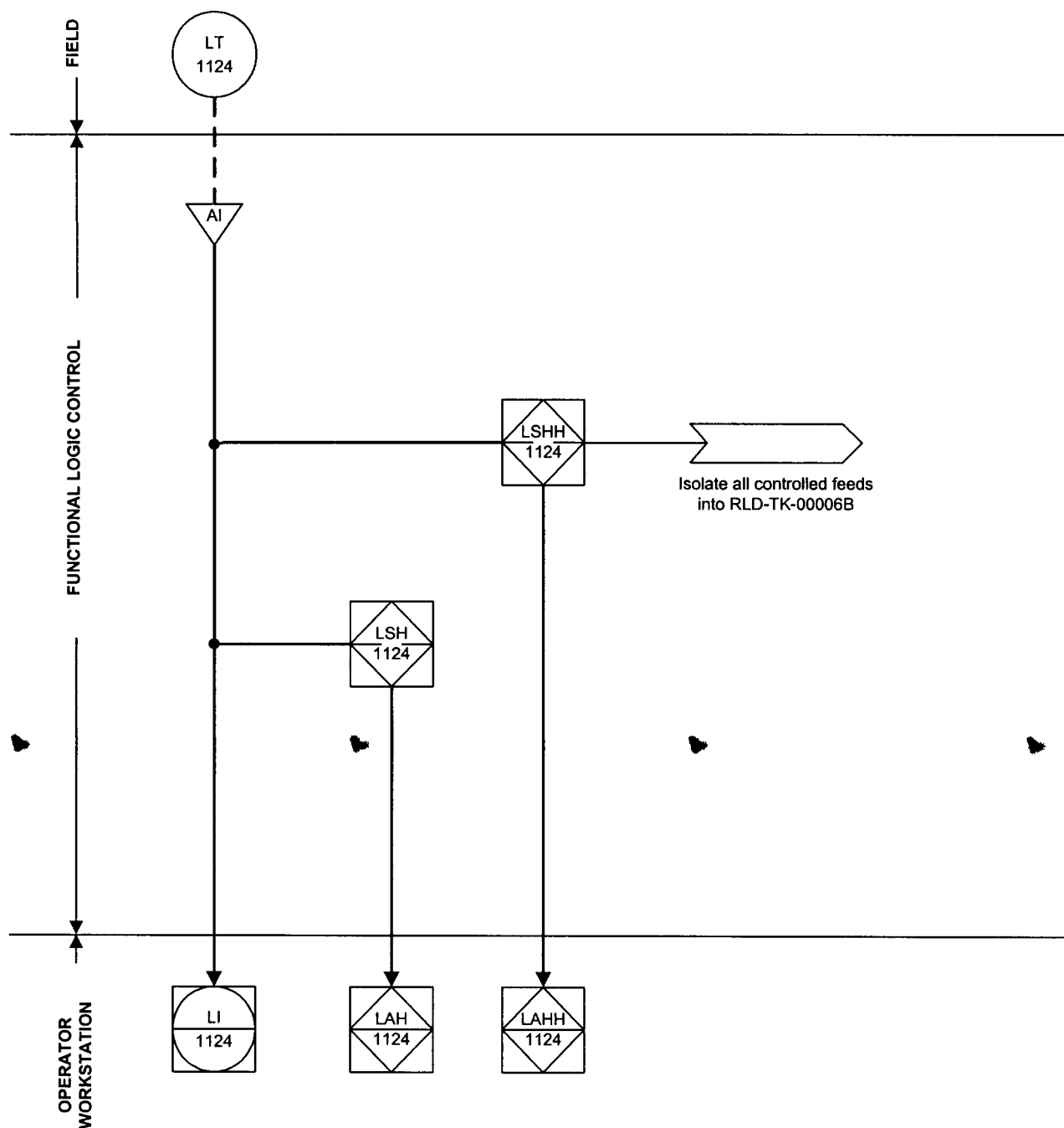


Figure 3 Level Measurement for Alkaline Effluent Vessel (RLD-VSL-00017A)

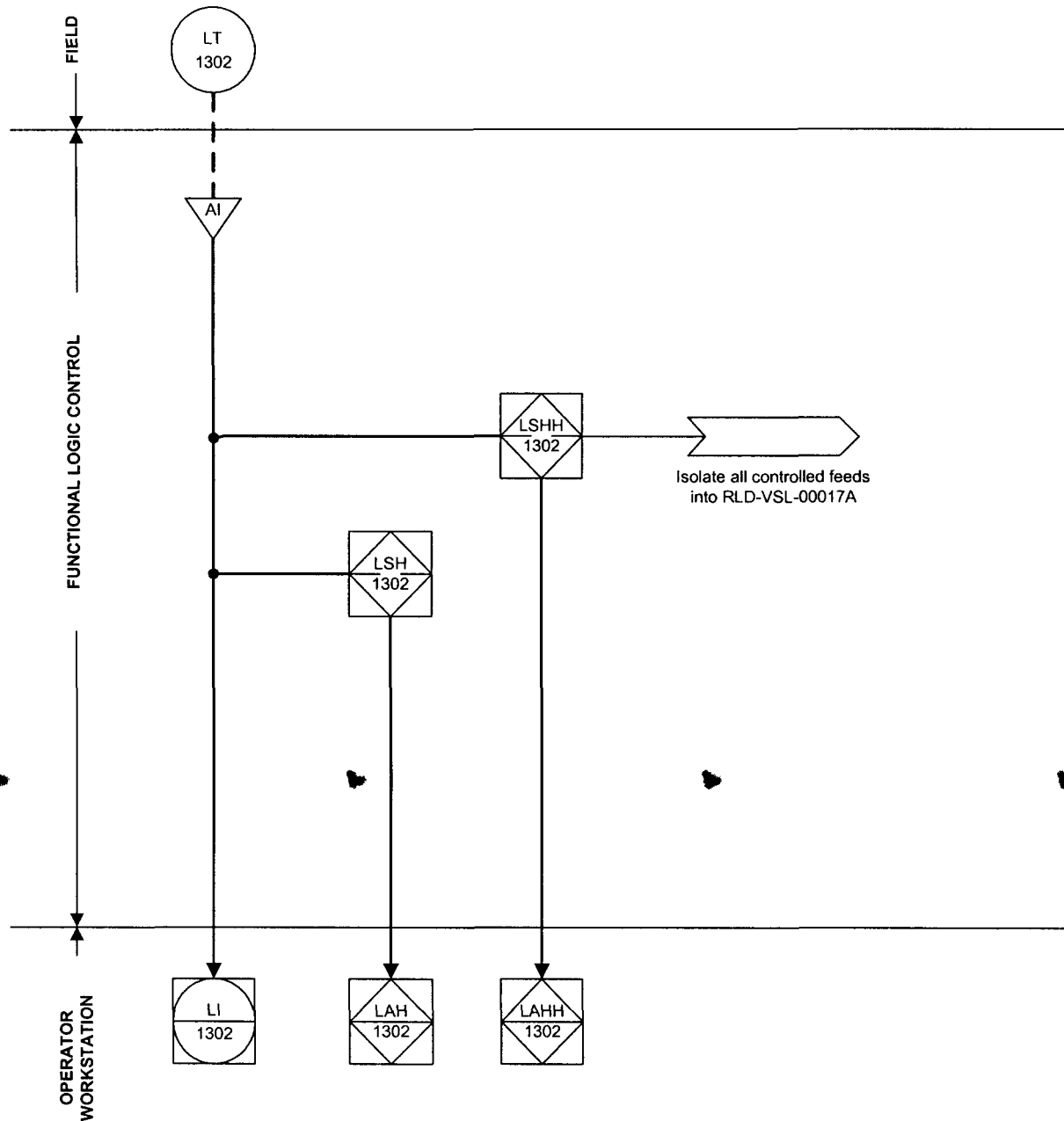


Figure 4 Level Measurement for Alkaline Effluent Vessel (RLD-VSL-00017B)

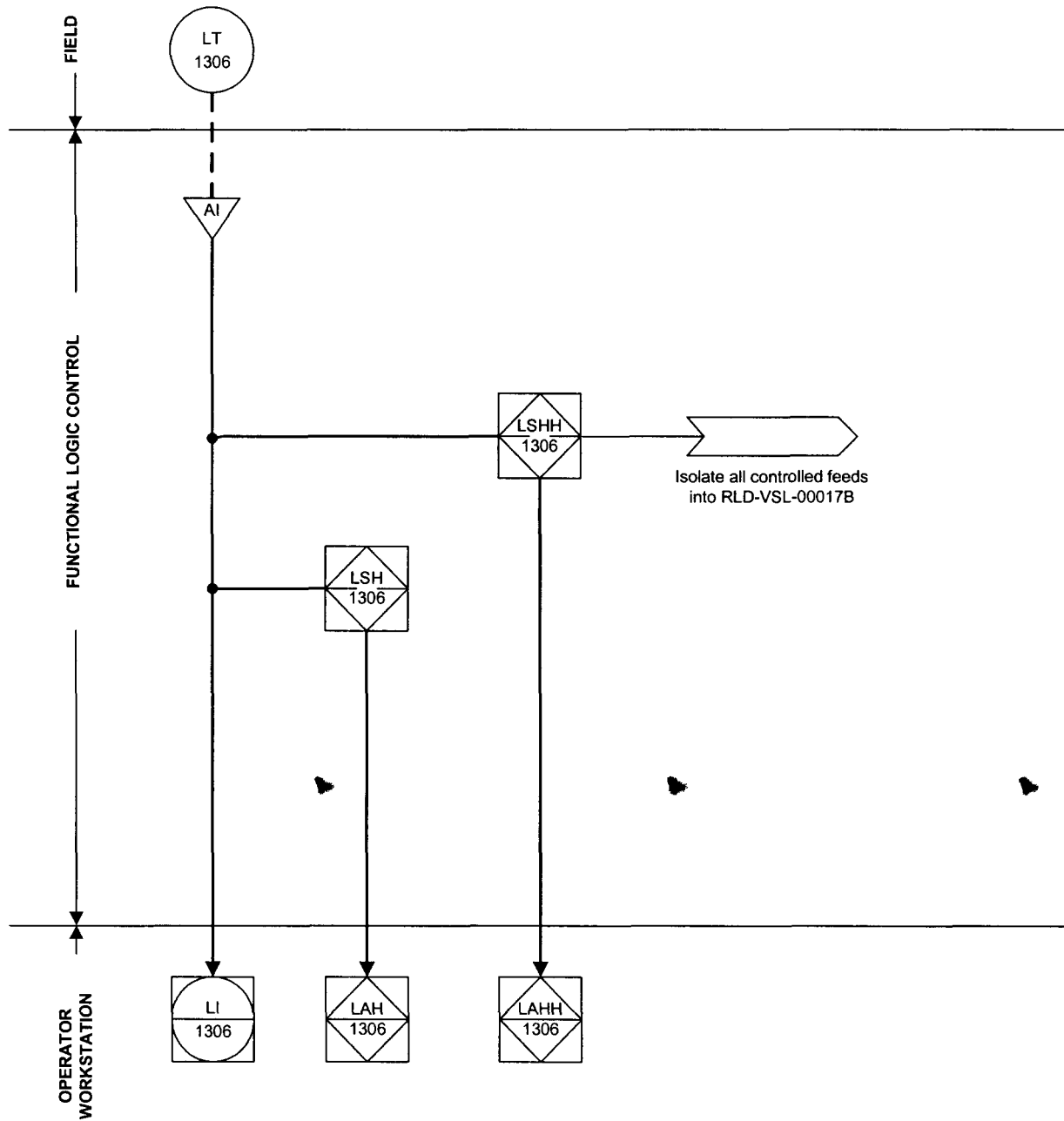


Figure 5 Level Measurement for Area Sump (RLD-SUMP-00003)

